



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/535,310

05/18/2005

Kenichi Fukuoka

28955.1049

3702

27890

7590

02/24/2009

STEPTOE & JOHNSON LLP  
1330 CONNECTICUT AVENUE, N.W.  
WASHINGTON, DC 20036

EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

02/24/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/535,310	<b>Applicant(s)</b> FUKUOKA ET AL.	
	<b>Examiner</b> Marie R. Yamnitzky	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 Nov 2008, 17 Nov 2008 and 07 Jan 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6,8,10 and 12-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6,8,10 and 12-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>17 Nov 2008, 07 Jan 2009</u> .                                | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1794

1. This Office action is in response to applicant's amendment filed November 05, 2008, which amends claims 1 and 4, cancels claims 7, 9 and 11, and adds claims 15-18.

Replacement sheets of drawings containing figures 3, 4 and 5 with added "Prior Art" labels were also filed November 05, 2008.

Claims 1-6, 8, 10 and 12-18 are pending.

2. The Information Disclosure Statements filed November 17, 2008 and January 07, 2009 have been entered. The cited references have been considered by the examiner and are made of record. (Cited references already of record in this application have been lined through.)

3. The objection to the drawings for lack of a "Prior Art" label on figures 3-5, as set forth in the Office action mailed June 05, 2008, is overcome by the replacement sheets of drawings filed November 05, 2008.

4. The rejection of claims 3 and 4 under 35 U.S.C. 112, 1<sup>st</sup> paragraph, as set forth in the prior Office action (mailed June 05, 2008) is overcome by claim amendment. The examiner has reconsidered the rejection as applied to claim 1 and dependents in light of the claim amendment, but is of the position that the rejection remains applicable to claim 1 and dependents (other than claim 3), including new claims 15 and 17.

The rejection of claim 11 under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, as set forth in the prior Office action is rendered moot by claim cancellation.

The rejection under 35 U.S.C. 102(b) based on Hatwar (EP 1187235) is overcome by claim amendment. (The examiner disagrees with applicant's argument that prior art Example N does not meet the luminescent intensity relationship set forth in present claim 1, but the issue is moot given the incorporation of the limitations of prior claim 9 into claim 1.)

The rejections under 35 U.S.C. 103(a) based on Hosokawa et al. (*Appl. Phys. Lett.*) in view of Wakimoto et al. with evidence supplied by Suzuki et al. is overcome by claim amendment.

5. Claims 1, 2, 5, 6, 8, 10, 12-15 and 17 are rejected under 35 U.S.C. 112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims, for reasons of record as applied to claims 1, 2 and 5-14 in the Office action mailed June 05, 2008.

6. Claims 17 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The penultimate line of claims 17 and 18 recites "3-fluorantenyl". It is not clear what "fluorantenyl" is.

Art Unit: 1794

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 5, 6, 10, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosokawa et al. (JP 2000-068057) with evidence of inherency supplied by Hosokawa et al. (5,536,949) for reasons of record as applied to claims 1, 2, 5-7, 9 and 10 in the Office action mailed June 05, 2008.

The limitations of prior claims 7 and 9 have been incorporated into claim 1.

As noted in the prior Office action, Hosokawa's host material DPVDPAN met the limitations of claim 7 (requiring a compound of formula (1)); this material also meets the further limitations set forth in new claim 15.

As noted in the prior Office action, Hosokawa's dopant DPAVBi met the limitations of claim 9 (requiring a compound of formula (2)); this material also meets the further limitations set forth in new claim 17.

The limitation added to claim 1 regarding the relative affinity levels of the two dopants was not in any of the previously examined claims. The prior art does not disclose the affinity levels of the two dopants, but even if coumarin 6 and DPAVBi of the prior art example referenced in the prior Office action do not inherently meet the affinity level relationship now set forth in claim 1, it would have been an obvious modification to one of ordinary skill in the art at

the time of the invention to select a combination of dopants providing the light emission characteristics taught by the prior art, and having suitable electron affinity levels to provide a functioning device (e.g. so as to provide for sufficient recombination of electrons and holes on both dopants).

9. Claims 1-6, 8, 10 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (6,224,996) for reasons of record as applied to claims 1-10 in the Office action mailed June 05, 2008.

The limitations of prior claims 7 and 9 have been incorporated into claim 1.

As noted in the prior Office action, Sakai discloses a material that met the limitations of claim 7 (requiring a compound of formula (1)); this material also meets the further limitations set forth in new claims 15 and 16.

As noted in the prior Office action, Sakai discloses a material that met the limitations of claim 9 (requiring a compound of formula (2)); this material also meets the further limitations set forth in new claims 17 and 18.

The limitation added to claim 1 regarding the relative affinity levels of the two dopants was not in any of the previously examined claims. While Sakai's examples use the same dopant in the two emitting layer, and therefore Sakai's examples do not meet the affinity level relationship set forth in claim 1, or the energy gap relationship for the dopants as set forth in claim 1, Sakai's devices are not limited to the use of the identical dopants in the two emitting layers. Sakai merely requires the dopants to be of the same type (having the same backbone

Art Unit: 1794

skeleton) or emitting the same color (classified into one of three primary colors; the examiner notes that compounds emitting the same primary color may still possess different energy gaps from each other since each primary color covers a range of wavelengths). It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to select a combination of dopants providing the light emission characteristics taught by the prior art, and having suitable electron affinity levels to provide a functioning device (e.g. so as to provide for sufficient recombination of electrons and holes on both dopants).

10. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosokawa et al. (JP 2000-068057) and further in view of Mishima et al. (2002/0096995) for reasons of record in the Office action mailed June 05, 2008.

Claims 12-14 depend directly or indirectly from claim 1. The limitations of prior claims 7 and 9 have been incorporated into claim 1. As noted in the prior Office action, Hosokawa's host material DPVDPAN met the limitations of claim 7 and Hosokawa's dopant DPAVB<sub>i</sub> met the limitations of claim 9 (requiring a compound of formula (2)).

The limitation added to claim 1 regarding the relative affinity levels of the two dopants was not in any of the previously examined claims. Hosokawa does not disclose the affinity levels of the two dopants, but even if coumarin 6 and DPAVB<sub>i</sub> of Hosokawa's example referenced in the prior Office action do not inherently meet the affinity level relationship now set forth in claim 1, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to select a combination of dopants providing the light emission

Art Unit: 1794

characteristics taught by the prior art, and having suitable electron affinity levels to provide a functioning device (e.g. so as to provide for sufficient recombination of electrons and holes on both dopants).

11. Applicant's arguments filed November 05, 2008 have been fully considered but they are not persuasive.

With respect to the rejection under 35 U.S.C. 112, 1<sup>st</sup> paragraph, applicant indicates that claims 1 and 4 are amended such that the rejection is rendered moot. The examiner agrees that in the case of claims 3 and 4, wherein the energy gaps of the first and second dopant must be greater than 2.7 eV, which corresponds to a wavelength of about 459 nm or less (e.g. blue or UV emitting dopants), the specification provides sufficient guidance as to make the full scope of the claimed invention. However, in the case of claim 1 and dependents (other than claim 3), the examiner maintains the prior examiner's position that undue experimentation would be required to make the invention commensurate in scope with the claims given the extremely large number of materials from which the hosts and dopants may be selected. For example, while the claims set forth a relationship between the energy gaps of the hosts and dopants, there is no upper or lower limit on the energy gaps such that hosts and dopants may be selected from materials emitting anywhere within the visible region of light (or even outside the visible region) so long as they meet the energy gap relationships set forth in the claims and, with respect to the dopants, the affinity level relationships. Formulae [1] and [2] define a broad group of compounds. Even with the limitation that at least one of the two hosts is a compound of formula (1) and at least one



of the two dopants is a compound of formula (2), the compounds of formula (1) and (2), and the host and dopant not limited to compounds of these formulae, may be selected from a very large number of possible materials. The specification provides insufficient guidance to make the scope of devices claimed in claims 1, 2, 5, 6, 8, 10, 12-15 and 17 wherein there are a very large number of possible materials for the hosts and dopants, and a combination of materials must be selected that meet certain relative energy relationships (i.e. relative energy gaps and relative affinity levels), and the materials must also be combined in such a way as to meet the relative luminescent intensity limitation of the claims.

With respect to the rejections based on Hosokawa et al. (JP 2000-068057), applicant argues that Hosokawa does not attempt to minimize light emission from one light emitting layer and maximize light emission from another. Applicant argues that maximizing emission from the first emission layer and minimizing emission from the second emission layer is a goal of the present invention. The present claims require the first layer to have at least 3.5 times greater luminous intensity from the first emitting layer than from the second emitting layer. However, both layers must be emitting layers, and there is nothing to restrict the second layer from having a high luminescent intensity as long as the first layer has a luminescent intensity that is at least 3.5 times greater. The relative energy gap limitations of the present claims (with the exception of claims 3 and 4) allow for combinations of dopant such as blue emitter in the first layer and green or red emitter in the second layer, or green emitter in the first layer and red emitter in the second layer. Hosokawa teaches adjusting color tone and also teaches providing white light. Adjustment of the amount of dopant in the different layers so as to adjust relative luminescent

Art Unit: 1794

intensities of the two emitting layers, thereby adjusting color tone and/or providing a white light emitting device would have been within the level of skill of a worker in the art at the time of the invention.

With respect to the rejection based on Sakai et al., Sakai teaches that the ratio of host to dopant in each of the layers may be determined based on considerations such as efficiency and device lifetime, and that the ratio of host to dopant is preferably in the range of 100/1 to 10/1 (e.g. see col. 41, l. 46-52). One of ordinary skill in the art knows that emission intensity is optimized by optimizing dopant concentration (as is known in the art, greater dopant concentration does not necessarily lead to greater emission intensity because quenching may occur if the concentration of dopant is too high). It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable ratios of host to dopant for each layer. Further, given the advantages taught by Sakai as being achieved by using dopants of the same type or emitting the same color, one of ordinary skill in the art would have reasonably expected that different ratios of dopants in the two layers, and different luminescent intensities from the two layers, could provide devices having Sakai's advantages. It would have been within the level of skill of a worker in the art at the time of the invention to optimize the compositions of (and thereby, inherently, the intensities emitted from) the two emitting layers so as to optimize device efficiency and lifetime as taught by Sakai.

The examiner has also considered the data of record and is of the position that the data do not demonstrate superior/unexpected results commensurate in scope with the claims.

Art Unit: 1794

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/  
Primary Examiner, Art Unit 1794

MRY  
February 14, 2009